Gray Chang

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THE NEWSLETTER OF THE
BAY AREA ATARI USERS GROUP
AUGUST 1982

FROM THE
EDITOR

For those of you attending last month's user group meeting Andy Soderberg should not be a stranger. He is the SYSOP (system operator) for the unofficial TEAM ATARI bulletin board system T.A.B.B.S. Bulletin boards are rapidly gaining popularity, the fascination of using one is as hard to describe to somebody unfamiliar with it as it is to describe to the uninitiated the feeling one receives from making that player missile just swoop in the right way, or to find the hidden key in an adventure game without getting wapped for 50th time ("Oops, you are dead!!! Another game (Y/N)").

If you have the 850 universal interface, the investment is a paltry $80.- for the upcoming group purchase of a direct connect modem. Software is available through the BAUG, and there is more to be downloaded from the bulletin boards. These TERMINAL emulator programs make your computer appear like a terminal to the computer systems on the other end. And you should know that the freely available software is much superior to what you can generally buy on the market (especially TELELINK I). The number of BBS's is presently mushrooming, we have listed a few of the local numbers, and if you are interested, read Andy's column starting with this issue.

When I first took over the post of editor, Dave had been in the unfortunate position of barely receiving any support, generally writing almost all the contributions for this publication. This month has been a very pleasant surprise for me. As you can see in this issue, quite a number of people have started to contribute. More columns have been promised, and I am looking forward to seeing them. I know, how it is with deadlines. If I was not the one responsible for putting this publication into the mail, I would not be writing this editorial on this beautiful Saturday afternoon.

The BAUG newsletter has been around for some time. While talking about, I noticed

CONTINUED

From the
President
August Meetings and Stuff

The August meetings will be on Monday August 2, and Tuesday, August 17. The first meeting will be at the Dysan Auditorium. It will feature Marvin Zeissler, author of Speed Read +, from OSS, and Robin Scherer, of Tricky Tutorial fame. Both will talk about and demo their programs.

We have been getting some requests to try a different day for the midmonth meeting so that some folks who can't come to our meetings on the Monday and Tuesday dates can attend. For this once we will meet on the 19th, Thursday, at 7PM, at Computer Capers in Mountain View. Our hosts are Tom and Helen Gracon.

Elsewhere in this issue Andy Soderberg mentions the possibility of a group buy on inexpensive modems. We have negotiated an excellent price on the Anchor Signalman Mark I modem. It is a simple, direct-connect modem. It does not feature auto-answer or auto-dial, but it does plug into a modular phone giving you much more dependable communication than an acoustic modem. I know, to my distress, that bumping an acoustic modem during a down or upload, or having someone pick up an extension phone, can completely garble a program in transmission. The unit operates on either a 9 volt battery (about 10hrs. life, with an on-off switch to extend battery life), or with a plug-in power adaptor. The price with tax and shipping is $75.00, and that includes cables for the Atari 850. The power adaptor adds $6.00 to the price for $81.00 total. This is the price for a 25 unit purchase. If you want to get started in telecommunications at a relatively low investment, and have an 850 interface, this is a good way to go.

We are working on some other possibilities for those who are interested in more sophisticated, but more expensive units. Some possibilities are a UDS 300-1200 baud, auto-answer, auto-dial modem for around $500.

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FROM THE EDITOR

that it became sort of cumbersome to refer to it as 'the newsletter', and it dawned on me, it was about time we gave it a name. One of the prime features of the ATARI operating system is the uniform and effective way it deals with I/O; the core of the code handling this is often referred to as CIO, Central Input and Output. This happens to be one of the major functions of this newsletter, too. CIO is nice, short, and somewhat catchy as a name. I liked it, Dave, and anybody else I talked to, liked it. And so (at least for the time being), we will name this publication CIO. Let me know, what you think of the name. It would also be of great interest to find out, what particular subject areas you want to read about. Remember, we are doing this for you...(is this an advertising slogan that has wormed its way into my subconscious?).

Harald Striepe

FROM THE PRESIDENT

We are also researching a modem made in Santa Clara with the same features for about $100 less.

We are ready to go with the purchase on the Signalman unit. If you wish to purchase one, send a check for $75 if you want the battery powered unit, or $81 for the unit with the power adaptor, to the order of the Bay Area Atari User Group, 4029 Payne Ave, San Jose, Ca. 95117. If we don't get at least 25 people interested, we will give those, who send in checks, a choice of having their checks back, or going ahead with purchase at a slightly higher price (shouldn't be more than $85 in that case). This offer on the Signalman modem is open to anyone, so if you have friends, who are not in the club that might be intersted, let them know.

We will let you know about the more expensive modems as soon as we have the info. Some other stuff we are researching are printers, Epson MX 100's priced around $640, a pen plotter for around $600, Disks for $19 a box, NEC printers for $490, 810 drives for about $400, the Axlon Ram-Cram 32K board for $100, and the Axlon 128K Ramdisk for $360. The prices I'm quoting here are for 1-3 units, volumes of 20 or more would result in further savings.

Please call or write and let me know, what kinds of hardware you are interested in. My source is willing to sell to the group for approx. 5% over his dealer cost on almost anything. Let me know what you want, and who makes it, and I'll get you a quote.

Those of you who already have a modem of one sort or another, should keep an eye on the TABBS for advance info on these User Group purchase offers. I will upload messages regarding this as I get the info.

Dave Flory

C I O

BAY AREA ATARI USERS GROUP
NEWSLETTER

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Deadline

Newsletter submissions must be in by the third Tuesday of each month. If material submitted is not of a time dated nature, it may not be published immediately. Publication decisions are at the discretion of the Editorial Staff.

Please submit articles camera ready, typed or printed in 3 1/2 inch columns, or as ATASCII/ASCII file on cassette or tape (media returned, if SASE is included). Articles may also be uploaded to T.A.B.B.S. after requesting password from SYSOP. Please, leave message including filename for the editor. Mail hard copy to the EDITOR, BAUG CIO

Subscriptions (which include Group membership) are $12 per year. Persons, who sign up after June 30, will be charged $6. Single back issues, when available, are $1 each.

TELECOMMUNICATIONS

by

ANDY SODERBERG

Welcome to what will hopefully be a regular monthly column. I would like to start out this first article by outlining, what I plan to cover in this column, and then make a proposal to you, the members of BAUG, about an idea that has come of age.

Telecommunications and Telecomputing, a couple of big words that until recently, were common only to big corporations, and those with money to throw away. Now, with the blessing of technology, and mass distribution, these 'big' words and all they represent become available to us, the public. Let us talk about what this new subject is all about and what uses we can make of it.

Webster's defines 'Telecommunication' as 'communication at a distance (as by telegraph)', and does not even list 'telecomputing' yet. From that we can see how fast technology has grown compared to the rest of society, they don't even reference telephones! For the sake of this column I will define TELECOMMUNICATION as 'The use of a computer or terminal to communicate with another computer, terminal or main frame (e.g. Compuserve, etc.) via the telephone (good ole Ma Bell).'

We are on the verge of entering into the 'INFORMATION REVOLUTION' for the society as a whole. With the use of personal, portable, and pocket computers and terminals, we can get access to most any information we would want: direct news, sports, access to the Library of Congress, stocks and bonds info, personal banking, and especially other computer users, who wish to share info, programs and ideas not necessarily of a computer nature.

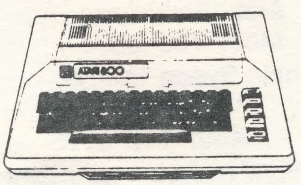
A community of people, who have common interests, but would otherwise never meet, who have s no physical boundaries, because they share ideas through a medium called the computer; and they meet at place called a Bulletin Board System, BBS for short.

Which brings us to the second part and focus of this article, and general focus of this column, the BBS. For those of you who did not attend either of the past two group meetings (you missed alot), I will tell you what I'm up to. I am the SYSOP (System Operator) of T.A.B.B.S., the TEAM ATARI BBS. It is a public Atari oriented BBS, which has grown from a test experiment to a very popular nationally used BBS. TABBA is run on an ATARI 800 with a compliment of peripherals, and public domain software written by the M.A.C.E. group in Michigan, which I has been modified to a great extent over the past two months. When I got started with this project, there were only two other ATARI BBS's running in the country, now, to the best of my knowledge, there are 20, and they are growing in number every week.

Now, for my proposal:

I wish to offer my talents to this group to make my T.A.B.B. System our group system. Now you may ask, what's so hard about that! Well, the system is running in my office on equipment that belongs to Atari, (yes I do work for Atari). It needs to be relocated, and equipment is to be aquired to support it. I will first talk about the BAUG's commitment that is required, and then talk about the benefits we expect to receive from this system.

In the near future, the system will be moved to my house, and will shrink in size and in on-line time. I have only one computer and wish to use it myself; I do not have a second phone line, and cannot afford one to support the calls. Over a period of time the group would buy, borrow, or be donated to, equipment to create a dedicated BBS. The group would pay for a receiving phone line and supporting material (diskettes and paper). The system purchase costs could vary greatly due to how they were obtained, a safe estimate range could be $1000 to $1800. The equipment would not have to be aquired all at one time. The sustaining costs



would be minimal, in the $20 to $50 per month.

Now for the benefits...

If the proposal is accepted, the BBS would be online 24hrs., 7 days a week. It would provide the ability to have:

1. A question and answer forum.

2. Public domain and user group software access, (download to your disk or printer, programs you want.)

3. Access to articles from the newsletter or other groups newsletters.

4. Info. and program sharing with other Atari BBS's from around the country without a long dist. call.

5. Sell advertising space on the BBS for revenue.

6. Read software and hardware product reviews from other users.

And the list goes on...

Now you may ask, 'What about me, I dont own a modem, and I don't know anything about this stuff!! Well, I have two good answers:

1. a group buy on a low cost direct connect modem for as low as $75!! (see elsewhere in the newletter for details),

and 2. Me.

My function as Sysop and author of this column is to help you learn more about telecommunications, telecomputing and how you can put them to best use for you.

At the next meeting we will take a vote on this subject of the BBS, and what avenue to take. Please attend, because if you need more info to decide how to vote, I and others will be on hand to answer questions.

P.S. It is my understanding that the investment for this venture would be paid for out of group funds and fund raisers, not from your pocket.

See you at the meeting! The topic of my next column is: "A User's Stroll Throught T.A.B.B.S", or "What Do I Do After I Plug In My Modem?"

Any and all suggestions or questions for this column are welcome and can be directed to:

Andy Soderberg
(408)-733-8586
or: Sysop (Andy)
T.A.B.B.S.
(408)-942-6975
5pm to 9am weeknites
5pm Fri. thru 9am Mon.

Note:

Originally we had planned to print a listing of all local BBS's in this issue, but we do not have enough space this time. To get the inforamtion, just call TABBS, and download the file LOCBBS.DOC. If you have never signed on, the procedure is very simple. Dial the number, and turn on your modem (must be in ORIGINATE). Once you are set up, type return. The system will prompt you from then on. In most cases, hitting a '?' when the menu is waiting for input will give you the command explanations. If you use an acoustic modem, keep it away from the TV and other sources of noise, do not insert the receiver too firmly, and make sure the cord is facing the right direction. If all else fails, give any of us a call. It might be interesting to note that the majority of this months articles were transferred by phone. You might also find a few of these columns on the BBS as download files.

HES

1 FORTH

OK Forth is a language that achieves its speed and power due to its similarity in structure to the actual operation of a computer. After going back and forth (ahem) over various ways of approaching the column, I decided to first cover some fundamentals hoping, this would not disappoint those of you anxious to begin. This month we will discuss number systems related to our computer, and a little bit of the internal architecture and workings of a CPU. I promise, this will not be a course in machine language.

But first a note about fig-FORTH 1.4S. Steve Calfee is to be credited for writing the original kernel and subsequent revisions. Since in this latest 'S' version the kernel was not changed, he suggested to retain the 1.4 revision label. This will avoid future confusion, and we are only to happy to oblige. Thus, from now on we are talking about fig-FORTH 1.4S.

On with the tutorial.

FUNDAMENTALS: CPU

The central element in any computer is the central processing unit, or CPU. From here all electrical activity of the machine is controlled, the CPU fetches instructions from memory, and executes these sequentially; it fetches data from memory, manipulates it using

internal registers (storage locations), and stores the result in perhaps the same or other memory locations. It addresses companion devices to perform I/O, input and output, sending data or commands to other devices (e.g. disk drives, or keyboard, or TV screen). In microcomputers, this CPU has been miniaturized to be contained in a single integrated circuit. In the case of our ATARI, this happens to be a 6502 originally developed by MOS Technology.

FUNDAMENTALS: NUMBERS

As you probably already know, present computers work with only two states, off and on (or high and low). Data is represented by two voltage levels using a binary code. When we write out a number in binary code, it first appears awfully confusing. But it is really not that difficult to understand. In our normal arabic number system, we use 9 symbols and a placeholder to represent basic quantities. We have the symbol 1 for a quantity of one, 2 for two, and so on. But what do we do beyond 9. We do not have any more symbols, primitive tribes simply shrugged their shoulders, and said "many". Our forefathers developed some other words (although they already had the arabic system), you are all familiar with the word "dozen". These are all ways to express quantities. Number systems simply add additional meaning by looking at where a particular symbol is with relation to others in a group representing the whole quantity. So, when we run out of symbols to express the number one more than nine, we simply start again with 1, move it over one place to the left, put a place holder behind it to show it is one over to the left, and then call this whole thing ten: 10. Now we can just simply continue with 11, 12 etc.

A binary number system runs out of symbols a lot earlier, so we must use the idea of placeholders with much smaller quantities. I should mention here that 0 was only a placeholder before the concept of it standing for nothing, our concept of zero, was developed. Confusing? Well, it will get easier. Since we can think of having nothing before having one, we start counting (in binary): 0, then 1, and... we are out of symbols. Now we pull our trick, move 1 over one place to represent the next number, add the 0 to mark the space, and we have 10 (binary) for two. Three is easy, we simply add 1 to have 11, but for four we are out of symbols again, so it becomes 100 (binary). Five becomes 101 (binary), six 110, seven 111, and so on. Of course, you can add and subtract with this as with any other number system. If you have trouble with this, play around with it for a while on paper.

FUNDAMENTALS: BYTES ETC.

So, this is the number system our ATARI really thinks in. To organize these numbers into convenient packages, the 6502 was designed in a byte sized architecture, which means that the CPU is always handling numbers that are eight binary digits long. So, a number might be 10010010, or 001100. Most internal registers (those were the little boxes for temporary shuffling of numbers inside the CPU), and all memory locations, and parallel data lines are eight digits, or more accurately, eight bits long. The biggest number one can express with eight bits is 1111 1111, or (quickly, in your head) 255. If we called the first memory location 0 that would mean we could address 256 locations using a byte sized architecture, not enough for us greedy hackers. Thus, cleverly a few registers were organized to be two bytes, or 16 bits long. This gives us the longest word of

1111 1111 1111 1111

(grouped in bytes for easy readability). Now we have 65536 memory locations, much more useful (but still not enough for some, some people will never be happy). To make things easier to understand, we talk in terms of kilobytes, when comparing memory. This idiom is confusing, when one is just about to learn the decimal system (kilo means one thousand), because in actuality one kilobyte is 1024 bytes. But it is convenient, because our memory designation is centered around the two byte word.

FUNDAMENTALS: HEXADECIMAL

Now, all these zeroes and ones are an impossible pain to work with, but the decimal system just does not easily fit with the internal byte architecture. So, to confuse all of you even more, we use the hexadecimal system. This is a number system based on 16. Now when we want to count beyond nine, we invent another symbol called A, easily available on all typewriter keyboards and printers, but very confusing at times. Again, we could have used some other convention, like printing 1 upside down for the quantity ten. In hexadecimal we count:

1 2 3 4 5 6 7 8 9 A B C D E F,

and then:

CONTINUED

10 11 12 ... 19 1A 1B ...1F 20,

pretty straight forward. Now, if we translate a byte like 0000 1111, we can just call it $ 0F, and the '$' sign designates it as a hex number (and shows the real preoccupations of the successful programmer).

FUNDAMENTALS: MEMORY and $

Now it all makes sense (I hope). The hex system is perfect for directly working with data and addresses related to the 8 bit per byte microprocessor. A byte of data always consists of a two digit hex number, like $04, or $0B, or $2F. An address is always a four digit hex number, so decimal 1536 (the beginning of the location, where a lot of people put their machine language subroutines) is $06 00, and the uppermost address way up in the place, where our ATARI has the operating system ROM (read only memory), is $FF FF. This is a point, where another idiom becomes easy to understand. You might have heard sombody talk about "pages" of memory, like "page 6" for the above mentioned location decimal 1536. With the binary, and the resulting hex number system, it becomes very easy to make another subdivision for a certain amount of memory. If we have a location designated by two bytes, like $06 00, then the upper bytes counts the number of 256 byte pages. So $06 00 to $07 00 means we moved 256 bytes, or one page. Four pages make 1024 bytes, which is our kilobyte (or 'K'). Pretty convenient after all, even if it is very confusing at first...

FUNDAMENTALS: "By your command..."

Enough of number systems, how does the CPU work anyway ? Well, to simplify matters a little bit, this is what happens.

When a CPU first is powered up, it will look in a particular memory location for instructions. Of course, this place would better be in ROM, because RAM (random access memory that can be read or changed) will forget the moment power is turned off. The 6502 is a good servant, and it will look for instructions. These instructions are nothing more than specific numbers (here we go again). Thus, if it encounters a $A9, it will execute a LDA immediate, e.g. it will fill one of its registers with the number immediately following the number $A9 in memory. Of course, one could go in either direction, and so by designation we go from lower memory starting with location $00 00 to higher memory ending with $FF FF. You can immediately see that to the outside observer there is no real difference between data and instructions in memory. The CPU will distinguish simply by the sequence in which it fetches the instructions, data, and memory locations. Some other instructions might tell it to jump to a particular location, and if you examine the RAM region, you would see $4c for the command JMP, followed by the first low byte, and then high byte of the RAM location to jump to to find the next instruction. Thus, go to decimal 1536, or $4C $0600 would look like $4C $00 $06 in consecutive memory locations.

There are many more instructions in the 6502 instruction set, these enable you to tell it to do comparisons, fetch data from memory, store data in memory, and branch under various conditions. It makes it possible to add, or subtract, or perform logical operations like AND, or OR, or EOR (more about those in a later column).

So, programming is pretty straight forward, all we have to do is break down what we want our little CPU to do, translate it into little numbers, put them in memory, and off we go. You can see, not many people would be so hooked to these little machines, if matters could not be made a little easier. This is (finally) the point, where computer languages enter the picture. And we will talk about these next month, and finally turn on your 800 to work with fig-FORTH 1.4S...

. 1 OK

PROBLEM HOTLINE

EVENING	CONTACT	PHONE NUMBER	SPECIALTY
MONDAY	Robin Ziegler	408-438-6879	FORTH and Assembly
TUESDAY	Chris McAfee	408-258-8442	Harware
WEDNESDAY	John Crane	408-268-7317	BASIC and FORTH
THURSDAY	Paul Conrad	408-226-7676	BASIC
FRIDAY	Skip Inskeep	408-251-5517	FORTH
SATURDAY	Bob Burkhalter	408-856-1893	Disk I/O
SUNDAY	Hans Hansen	415-490-0175	DOS I & II

PLEASE

call only between 7 P.M. and 9 P.M. on the night the individual is listed as being on call. If you cannot get an answer, try one of the club officers.

Useful Hardware Modifications for the Atari 400

by Mark Crispin

This is my collection of notes about various hardware modifications to the ATARI 400 which I've made. Please excuse the lack of detail in some of these notes; I'm typing this all in from memory. None of these modifications are terribly difficult, though, so you ought to be able to figure things out.

If you do not have the Hardware Manual (it's part of the "Technical Users' Notes" -- the orange book), you should get it. It's order number C016555 (or was when my copy was printed). It really contains everything you need to know if you know where to look, including schematics. Unfortunately the schematics look like xerox copies of photo-reduced copies of copies, so they don't win prizes for readibility.

I've made the following changes to my ATARI 400:

- upgraded main memory to 48K
- installed GTIA
- installed the "B" revision of the operating system
- installed the fast math chip (FASTCHIP, from Newell Industries in Plano Texas)
- installed an 800 keyboard

I'm also planning on other neat things, such as installing an audio output jack to connect to my stereo, installing a Z80 as a second processor, and installing a hard disk. I haven't figured out how to do these yet, and these projects have gone to the back burner with additional demands at work popping up.

First, let's talk about some of the modifications ATARI will do for you. I lucked out in that my 810 disk already had the "C" ROM and a data separator installed. Unfortunately, my 400 was made just before GTIA and the "B" operating system were standard. ATARI field service will do these upgrades for you for free, PROVIDED your equipment is still within the 90 day warranty. I was able to get my 400 in for GTIA 2 days before the deadline, but they weren't doing "B" OS upgrades for 400's back then. If your system is out of warranty, ATARI will charge you an arm and a leg for the upgrades. I consider their prices outrageous, and more so by the fact that they'll keep your computer for a week or so while they are "testing" it.

I honestly don't know how to do the "C" ROM and data separator upgrade for the 810 disk. As I said, I didn't have that problem. There are several excellent technical descriptions in the various publications on how to do it; it doesn't seem to require more than about 15 minutes of unskilled labor to do it.

The ATARI 400 computer disassembles into several parts. These are: the top and bottom halves of the case, the keyboard controller, the speaker, the power supply board, the mother board, and miscellaneous stuff like screws and a metal plate. The keyboard controller is simply the 400 keyboard. It has a small ribbon cable on it that plugs into the mother board. The power supply board is the small board on the right hand side of the computer, fastened to the metal shielding. It receives power from the plug-in power supply, and also handles miscellaneous functions. The mother board is the interesting board. It is mostly surrounded by the metal shielding (to keep RF from leaking out and causing TV/radio interference), but a bit of it sticks out in front and connects to the power supply board. Inside of the RF-shielded area (the metal plate on the bottom is how you get to it) are the "guts" of the computer. The operating system ROMs, POKEY, and the 6520 PIA are on the mother board. The mother board has three connectors. The first is the connector for the cartridges (BASIC, etc.), the second is the connector for the RAM memory. Finally is the CPU board, which holds the 6502 CPU, ANTIC, and CTIA/GTIA. You might want to look at the contacts on the CPU board sometime to see if they are tin-plated or gold-plated. Older computers have tin-plated contacts, when get crufty over time. If your computer crashes repeatedly or won't boot, this is the first thing you should expect, especially if the symptoms are: blank or monochrome screen, garbage on screen, or corrupted screen display (the last indicating that the path from CPU to RAM isn't fully functional). Rubbing the contacts with a (clean!) eraser will clean them off and cure your problems and save you an expensive trip to field service. Of course, the problem will eventually come back. A more permanent cure can be effected by buying a new CPU board with gold-plated contacts. According to customer service, that is part CA014800 and costs $44.76 from field service. That is just the board; you'll have to transfer the IC's from the old CPU board to the new one.

Before we go into the various upgrades on the 400, let's talk about taking it apart. If you buy INTEC's 48K RAM upgrade kit, you will get instructions on taking it apart which you could use

for the other upgrades. I should warn you on their instruction 5 that you must first pull the mother board straight up to disconnect it from the power supply board before lifting it out into a vertical position. They imply that you lift it the way you'd open a door; it will not "swing" up unless you break the connection to the power supply board.

I prefer my way of doing things, which takes the entire computer apart and generally lets you put things you don't need away while you're working. INTEC only half takes things apart for faster reassembly. My way is as follows:

1. Remove cartridge and close door. Disconnect power.

2. Remove the screws on the bottom of the case. Turn the computer right-side up.

3. Open the cartridge door. Gently lift the top of the case off and turn it to the right as soon as it clears the cartridge door.

4. You will notice the keyboard controller fastened to the top of the case and connected with a ribbon cable to the mother board. Very gently pull the ribbon cable out of the mother board, grasping it as close to the connection as possible. Do not pull it out by the keyboard controller!

5. The top of the case is now physically disconnected. If you need/want to remove the keyboard controller from the case you can, by very gently bending it so it comes free of its fastening hooks. I find it easier to do this if I want to test with the keyboard before reassembly, since the keyboard is much less bulky than the top of the case.

6. Disconnect the speaker. It plugs into the (power supply?) board in an obvious way.

7. There is a black cable which plugs into the power supply board and loops around, goes around a toroid in the back, and exits the computer. You know this cable as the one you connect to the box that goes on the TV (the RF output cable). Take a moment to familiarize yourself with how it fits in. Its exact placement isn't really critical, but being poorly placed will cause you difficulty in reassembly. If you look you'll see notches where it slips through. Once you think you understand how to put it back the way it was, unplug it from the power supply board.

8. Lift the power supply board/mother board/chassis assembly out and turn it upside down. Note that there are a few pins where the assembly slips in, especially a rather large one in the back right-hand side with a corresponding hole in the power supply. You'll have problems with putting it back together if you don't get it in there.

9. Remove the aluminum plate and fisch paper from the bottom of the mother board. There are 8 screws securing the plate which not surprisingly have to be removed first.

10. You are now ready to lift the mother board out. Lift it out straight up. If you look around you'll see the electrical connector between it and the power supply board. Be careful not to bend all those pins. Don't use excessive force. If it won't budge, you aren't lifting it out straight up.

11. On the mother board, there are two smaller boards plugged into it. The one in the back (or outside) is the CPU board. The other one is the memory board. Note that on both boards, the IC's face towards the back of the computer, AWAY from the rest of the mother board. You will be very sorry if you plug either board in the wrong way.

12. Putting the machine back together is essentially a reverse of all of these steps. Check that everything is reconnected before closing up the machine; I often forget to reconnect the speaker. You may need to use some elbow grease to reconnect the keyboard controller, but be judicious. If you aim the pins in straight, it should go in and you shouldn't bend any pins. I like having the keyboard controller disconnected from the case top before reconnecting it, then fasten the keyboard controller to the case top. Remember too that everything should slip together nice and neatly. If the system won't close up neatly, something is positioned wrong. Remember too that the cartridge door needs to be open before putting the case top back on, because the door slips through the top.

If all of this sounds terribly complicated, it really isn't. Use common sense; there aren't that many pieces. Sometimes the RF cable gets in the way but it really only will fit in one way -- the right way.

Now, lets get on to the good stuff. You can get a GTIA and the "B" ROMs from ATARI field service as spare parts. I believe that GTIA is part number C0122296 while the "B" ROMs are part numbers C012499B and C014599B. If they tell you they can't sell you parts, tell them otherwise. Not surprisingly, they would rather have you pay for their labor; they charge $60 or so to install the "B" ROMs, but the parts cost is only about $20. If you're insistant enough, they'll sell you the part (they have to; spare parts IS part of their business).

These are IC's and you may want to find out how to install and remove IC's from sockets if you don't already know. CTIA is located on the CPU board and is part C012295; just remove it and replace it with GTIA, making sure the notch on the chip is in the same direction. The "A" ROMs are parts C012499A and C014599A and live on the mother board; if you notice a similarity between the numbers it isn't coincidence. If you get the fast math chip (FASTCHIP) there is a third ROM (C012399) next to one of the "A" , ROMs and the fast math chip replaces that.

Installing additional memory on the 400 requires buying either a 32K or a 48K board to replace your 16K board. Many places will offer to install your 48K board at parts cost; what they don't tell you is that they'll keep your 16K board and sell it to 800 owners. There's quite a market among 800 users for former 400 16K boards, since being "used" they are cheap and they also don't have that damned plastic box around it that keeps the board from being properly ventilated. If you do it yourself you can sell your 16K board for at least $35. To install 32K, you just replace the 16K board. Installing 48K is a bit more complicated since the 400 doesn't have the logic for deselecting RAM when there is ROM in those addresses (after all, a 400 will never have more than 16K, right?). INTEC provides a jumper overlay which you solder on the bottom of the mother board. INTEC seems to have the best 48K board; among other things they use 64K RAMs which won't consume excessive amounts of power (if you use a competitor's board, it may use more power than the power supply is built to deliver and you'd need to replace some diodes on the power supply. The INTEC board retails for $299 but you can get it for $225 or even $199 if you shop around.

My most recent pride and joy was in getting an 800 keyboard on the 400. I was able to buy an 800 keyboard for $17.50 plus $10 UPS from:

H.S.C. Electronic Supply - 338 2545
5549 Hemlock Street 916
Sacramento, California 95842

They'll take phone orders with MasterCard or VISA. That's a very good price for a keyboard no matter how you look at it. I'd suggest calling since they may be gone by now.

Looking at the 800 keyboard, you'll observe a connector conspiracy. The 800 has an 18 pin female connector, while the 400 has a 22 pin male connector. Fun! Reading the prints, you'll observe that four of the lines on the 400 keyboard are for the console keys which are on the 400 keyboard but are absent on the 800 keyboard (there is a separate keyboard for the console keys on the 800). 22-18 = 4, what a coincidence. Now, unless you want to do without the console keys, you'll need to figure out how to connect the two keyboards in parallel. I bought a dummy 25pin 1-row DIP and clipped off three pins at one end. Next, I took a section of ribbon cable and connected it to the remaining 22 pins. I now had a connector which accepted the 400 keyboard at the female end and plugged into the mother board at the male end, but also had an additional cable coming out. I finally got a suitable male connector for the 800 keyboard, connected it to the cable, and I was in business.

This isn't enough to work with, of course. First, let's consider color coding. If you buy a length of ribbon cable (say 5 feet or so of 25 wire color-coded cable), you'll notice that the color at one end is brown. Let's call that wire 1, with the end wire being wire 25. We won't use wires 23, 24, or 25 at all; if it makes you feel happy tear them off the cable, but who knows, someday you might think of a use for those wires and wish they were there. Brown wire 1 corresponds to the brown wire on the ribbon cable coming out of the 800 keyboard to the female connector. All the other colors should match up too up to wire 18. Don't worry about wires 19, 20, 21, and 22 right now. So now you can see how to connect those wires to the male connector which goes into the 800 keyboard's female. Essentially, you've extended the 800 keyboard's ribbon cable by a few feet.

By the way, you will notice the 800 keyboard's ribbon cable is sort of taped to the bottom of the keyboard. DO NOT UNDER ANY CIRCUMSTANCES REMOVE THE 800 KEYBOARD CABLE FROM THE BOTTOM OF THE KEYBOARD. AS SOON AS YOU GET THE KEYBOARD, TAPE IT DOWN FURTHER SO THERE IS NO CHANCE OF IT MOVING. For some reason, the 800 keyboard cable is very stiff and moving it will break the wires where they connect to the PC board. It is NO FUN AT ALL trying to get all those wires re-soldered and you'll waste hours of your time if you lose this way. [Listen to the voice of experience]

What goes on at the 400 end of things is a bit trickier. There is not very much space at all to have that little "Y" connector so you may have to clip the pins on the dummy DIP to be pretty short (less than 1/4 inch). If you can wire-wrap the ribbon cable onto the pins so much the better. Of course, soldering 22 pins to 22 wires in such narrow confines is character building and will make you appreciate the results of your effort more... Wire 1 (brown, you remember) is the wire at the end of the keyboard connector on the mother board pointing to the back of the computer.

Once you get the Y connector you've built in and the 400 and 800 keyboards both connected, test it. Try the 400 keyboard first to make sure you've introduced no shorts (try a bunch of characters as well as the console keys), then try the 800 keyboard. If the 400 keyboard works but the 800 keyboard gives you the wrong characters, you have the connector in backwards. If the 800 keyboard responds on some characters but not others you have a bad connection (or a short if the 400 keyboard loses too). Debugging your connection will take a variable amount of time depending upon how good your original work was.

If that all works it's now time to close up. You'll have problems. The designers of the 400 keyboard never planned for somebody to put this connector in between it and the mother board, so there is little room to spare. Try cutting the pins on your "Y" connector fairly short. The problems you'll notice are that the case won't close down on that side and the 400 keyboard cable gets in the way of the power on light. With enough trimming and making sure everything is connected in firmly you should eventually be able to make it all fit. You also have

the worry about where the ribbon cable to your 800 keyboard should go and where is a convenient place for it to exit the machine. I leave that exercise to your own preference. I experimented with a number of configurations and eventually settling on one which had it go out through the hole on top of game controller #4. It doesn't block access to the controller, and I didn't have to drill a hole. You could also have it go under the mother board in front and loop around and come out on top of controller #1. There are undoubtably others.

If your experience is like mine, you'll find that packaging is the most expensive part. So far, I've talked about a $35 investment, $10 of which was shipping! Getting a box to put the beast in can set you back a lot more. For example, a keyboard shaped metal box could cost as much as $25, and getting a hole punched in it professionally could run you $40 or more. Because of the packaging costs, if I were to perform a keyboard upgrade for somebody I'd charge at least $200; $100 parts plus $100 for a not insignificant amount of labor. And that would be a bargain! If you "roll your own" and can find someplace local which will sell you an 800 keyboard as cheaply you should be able to do it and only set yourself back $25.

Another packaging issue you ought to consider is whether you really want a fixed connection between keyboard and computer. It gets very inconvenient. You will find that the connector on the 800 keyboard isn't useful to make a detachable keyboard because it is too close to the keyboard. I found that I had to have my ribbon cable go into the keyboard box and connect inside. What you really want is to have another pair of connectors near the computer. If you want to be really fancy you'd drill a new hole in the case and have the connector appear there. Then you'd have the keyboard with the long cable and it would plug into that connector. That way you could detach the keyboard (which is convenient when moving the computer) any time you want and wrap the cable around the keyboard instead of having a long cable dangling from the computer. I presently have a fixed connection, but am going to rebuild my cable to give me a longer wire and make the keyboard detachable.

How detachable do you want to make it? Well, my suggested way of doing things makes it so you can remove the whole kit and kaboodle from the 400 at any time. It is detachable by opening the computer, as opposed to being able to remove the keyboard without opening the computer or removing the "Y" connector inside. You really want both, but if you are less concerned with being able to remove this modification you could solder the ribbon cable directly to the bottom of the mother board at the keyboard connector. That certainly makes the space problem go away and everything will fit neatly, at the risk of making a permanent change to the mother board, not being able to remove it, or of damaging it. It's your choice.

Now, about those other 7 wires. As you remember, we connected 22 wires to correspond to the 22 wires on the 400 keyboard, but only connected 18 of those wires to the 800 keyboard. Well, if you do some thinking you'll realize that wires 19, 20, 21, and 22 have the signals for the console keys (START, OPTION, SELECT, and SYSTEM RESET). You could do something clever like buy some pushbuttons, install them on your keyboard box, and connect those to the signals. I don't know what should happen when the switch is closed; presumably you should ground it. The prints only show those four signals going to the console switches so grounding doesn't sound totally unreasonable. You'd then have on your keyboard the four console buttons, which, if you have a nice long ribbon cable, would allow you to sit in your easy chair away from the computer with the keyboard on your lap and not have to get up to go to the computer.

As for the other three signals, well, I can think of a use for two of them; a remote power switch! You could also have a normally closed pushbutton switch (that opens when you push the button) which would give you a "boot" button (push it, and the system reboots) for those times when SYSTEM RESET won't work.

Good luck!

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FROM THE
SECRETARY

A few months ago I mentioned that LJK was coming out with a data base management program called DATA PERFECT. It finally was released and typical of LJK, it had several bugs. However, a revised edition was released which fixed those problems. The program is very powerful, fast operating, and relatively convenient to use. The user interface is fair and some sections of the manual seem to have written by a graduate of the Digital Research swahili course. It is more powerful than the current release of File Manager 800 and runs much faster because it is written in assembler. The bad news is that a I wouldn't recommend it to a beginner unless he needed the its capabilities because of the problems in getting started with the package. Its only major limitation (shared with File Manager 800) is that a data base can occupy only one disk. This is a major disadvantage for some applications, which can be overcome by obtaining a disk drive with greater storage capacity; but DATA PERFECT is probably not compatible with double density (at least the documentation doesn't indicate that it is).

BENCHMARKS REVISITED

In October 1981 our newsletter carried a short article describing the results of running the Interface Age Prime Number Cruncher benchmark, which calculated the prime numbers less than one thousand. Atari Basic required 1626 seconds, while Basic A+ required 1523 seconds to execute the benchmark in Graphics 0. Major improvements in the execution speed could be obtained by using Graphics 3, or running without DMA by Antic.

Two new weapons have been introduced in the Atari users Basic programming arsenal which can improve program execution speed. The first is Atari Microsoft Basic, and the second is Fastchip from Newell Industries. Atari Microsoft Basic executed the benchmark in 1116 seconds in Graphics 0, equivalent to the Atari Basic time with no DMA. The time for Atari Basic with the Fastchip was 1222 seconds in Graphics 0. Use of the Fastchip does not affect execution time of Microsoft Basic. Further benchmark times will be published in a future issue of Antic if I can talk Jim Capparell into printing it.

ANTIC

If you haven't seen it, hurry down to your friendly neighborhood Atari dealer, and buy a copy of the latest issue. Jim Capparell is to be congratulated on the fine start he has made on his magazine. The first two issues have been filled with timely information. The June issue, for example, focuses on communications with articles on modems, communications software, and information utilities. Other items of interest include articles on Forth, Pascal, and Pilot. The Atari user no longer needs to feel left out, when he puruses the newstand and sees the Apple, IBM, and TRS80 support magazines.

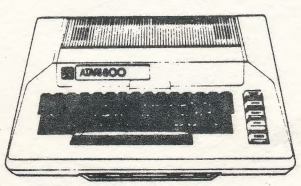
July 12 Meeting

Andy Soderberg of Atari, aka Sysop Andy of the Team Ataria BBS, discussed the role of microcomputers in communications. In particular, he discussed the new BBS software developed by M.A.C.E., which he has greatly improved and is using to operate the Team Atari BBS. Andy has offered to serve as the Sysop for a proposed BAAUG sponsored BBS, which would replace the present Team Atari BBS operating at Atari.

The second speaker of the evening was Bill Wilkinson of OSS. Bill presented a series of benchmarks, which graphically demonstrated situations in which Atari Basic and Basic A+ were faster than Atari Microsoft Basic. The results will be presented in his column in COMPUTE.

The third speaker of the evening was Kevin Karpus, who played some recordings of computer generated guitar music. The tape was very impressive and is indicative of the advances that are being made in this area.

Robert Kawaratani



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